

REMARKS/ARGUMENTS

Reconsideration of this application, in view of the following remarks and arguments, is respectfully requested.

Claims 1-15 were originally presented for consideration in this application and currently stand rejected under 35 USC §103(a) as being unpatentable over U.S. Patent 4,948,948 to Lesage in view of U.S. Patent 6,633,726 to Bradenbaugh. This rejection is respectfully traversed for the following reasons.

In a representative embodiment thereof schematically depicted in FIG. 1 of applicants' drawings, the present invention provides an electric water heater 10. The water heater 10 has a vertical, representatively cylindrical tank portion 12 in which a quantity of pressurized water 14 to be heated is stored, the tank 12 having a total interior volume V. Extending upwardly from the upper end of the tank 12, and communicating with its interior, are the usual cold water inlet, hot water outlet and temperature and pressure relief fittings 16,18,20. Extending outwardly around the tank 12 is a jacket structure 22 that forms around the tank 12 a cavity which is filled with a suitable insulation material 24.

According to a key feature of the present invention, the water heater 10 is provided with a specially designed equal wattage density electric heating system used to heat the water 14 in the tank 12 for on-demand delivery therefrom to various plumbing fixtures such as, for example, sinks, showers, dishwashers and the like. Illustratively, but not by way of limitation, the heating system shown in FIG. 1 comprises a vertically spaced plurality (representatively two in number) of electrical resistance type immersion heating structures 26,28 which horizontally project into the interior of the tank 12. Heating structures 26,28 are representatively single electric heating elements, but could each alternatively be a closely grouped plurality of individual elements if desired.

The upper electrical heating element 26 serves and is positioned at the bottom of an upper tank water zone Z_1 having a volume V_1 , while the lower electrical heating element 28 serves and is positioned at the bottom of a bottom tank water zone Z_2 having a volume V_2 which is representatively twice as great as the volume V_1 . Upper heating element 26 has a heating wattage W_1 which is half of the heating wattage W_2 of the bottom heating element 28. Thus, according to a key aspect of the present invention, the heating system incorporated in the water heater 10 provides each of the unequal volume water zones Z_1 and Z_2 with **equal heating wattage densities** (e.g., watts/gallon) using **unequal wattage** heating elements.

Via independent Claims 1, 8 and 14, all of applicants' Claims 1-15 specify, in one manner or another, an electric water heater (or liquid heating apparatus as the case may be) having a tank portion with **unequal volume** interior zones respectively served by spaced apart **unequal wattage** electrical heating structures extending into the interior of the tank and providing the zones with substantially **equal heating wattage densities**.

In the water heater illustrated and described in U.S. Patent 9,498,948 to Lesage, the top electrically resistive heating element 15' (see FIG. 1) serves approximately 12 gallons of water in the 60 gallon tank and has an electrical power rating of 3,800 watts to 4,500 watts or more; the middle electrically resistive heating element 15'' serves approximately 18 gallons of water in the tank and has an electrical power rating of 1500 watts which is less than that of the top element 15'; and the lowermost resistive element 15''' serves the 30 gallon balance of the tank water and has an electrical power rating of 800 watts or more - less than the wattage of either of the other two heating elements 15' and 15''.

There is thus a specific teaching in Lesage of providing **unequal wattage density heating** of its water heater tank zones respectively served by the various electric heating elements projecting into the water therein. Lesage also teaches (see the Lesage specification beginning on line 6 of column 4) that this unequal wattage density heating technique (with the largest wattage heating element serving the smallest volume top tank zone) is **necessary** to reduce power demand by water heaters during peak load demand periods on electrical distribution networks. Thus, Lesage teaches **directly away from** an **equal** wattage density heating of the entire water heater tank volume using unequal wattage electric heating elements as specified in applicants' Claims 1-15.

This clear deficiency in Lesage is in no manner cured by the teachings of U.S. Patent 6,633,726 to Bradenbaugh which discloses the use of a proportional band controller to provide pulsed firing of two vertically spaced resistance type electrical water heater heating elements 16, 16' (see FIG. 5). One of the stated purposes of this electric heating element **control** technique is to **avoid** uneven heating of the tank water (see column 11 of the Bradenbaugh specification, beginning on line 52 thereof). Accordingly, Bradenbaugh teaches **away from** the uneven tank water heating scheme **required** in Lesage.

Thus, it is respectfully submitted that it would **not** be obvious to combine the Lesage and Bradenbaugh references. Specifically, to incorporate the Bradenbaugh heating element control technique in the Lesage water heater apparatus to provide essentially equal heating of all portions of the Lesage tank water would defeat the **purpose** of the Lesage unequal tank water heating system - namely to use its disclosed **unequal** tank water heating scheme to reduce power demand by water heaters during peak load demand periods on electrical distribution networks. It is a well established principle of U.S. patent law that if a proposed reference combination defeats the purpose of the teachings of one of the

references, or renders its structure less effective for its intended purpose, the proposed reference combination cannot properly be made.

Further, even if the Lesage electric water heating elements 15', 15'', 15''' were to be controlled by the Bradenbaugh pulsed control system in a manner providing essentially even heating of the Lesage tank water, the resulting system would still **not** meet the limitations of applicants' Claims 1-15 since the Lesage electric water heating elements 15', 15'', 15''' would still not provide the Lesage tank zones respectively served by the heating elements with the substantially **equal heating wattage densities** required by Claims 1-15. Specifically, the top Lesage element 15' would still be the **largest** of the three heating elements while serving the **smallest** tank water zone so that the Lesage heating system would **still** provide **unequal wattage heating densities** for its illustrated tank water zones.

In this regard it should be noted that there is no teaching or suggestion in Bradenbaugh relative to the relative **wattage sizes** of the two electric heating elements 16, 16' shown in FIG. 6 or the two electric heating elements 235, 240 shown in FIG. 8. There is thus no teaching in Bradenbaugh that would in any manner suggest modifying the **wattage sizes** of the Lesage heating elements 15', 15'', 15''' to achieve an even heating wattage distribution within the Lesage tank water. Tank water heating uniformity in Bradenbaugh is achieved, according to the Bradenbaugh disclosure, by the **method** by which its electric heating elements are **controlled** - not by their relative **sizes** or **placements** within the water heater tank.

For the foregoing reasons it is respectfully submitted that the Examiner's proposed combination of the Lesage and Bradenbaugh reference cannot properly be made, and even if it were made the resulting water heater system in Lesage would not meet the above-discussed limitations in applicants' Claims 1-15.

The Examiner has thus failed to establish the requisite *prima facie* case of obviousness of Claims 1-15 using the Lesage and Bradenbaugh references. This obviousness rejection should thus be withdrawn.

In view of the foregoing amendment, remarks and arguments, all of the claims currently pending in this application are now seen to be in a condition for allowance. A Notice of Allowance of Claims 1-15 is therefore earnestly solicited.

The Examiner is hereby requested to telephone the undersigned attorney of record at 972/516-0030 if such would further or expedite the prosecution of the instant application.

Respectfully submitted,

KONNEKER & SMITH, P.C.



J. Richard Konneker
Attorney for Applicants
Registration No. 28,867

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660 N. Central Expwy., #230
Plano, Texas 75074
972/516-0030

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Stane Sutton